——— 1807. *Recherches arithmétiques* (A. C. M. Poullet-Delisle, Trans.). Paris: Courcier.
——— 1889. *Untersuchungen über höhere Arithmetik* (H. Maser, Trans.). Berlin: Springer. (Reprint, New York: Chelsea, 1965.)
——— 1966. *Disquisitiones arithmeticae* (A. A. Clarke, Trans.). New Haven, CN: Yale Univ. Press.

Project on Interrelations between the Development of Theoretical Mathematics and Applications during the 19th Century

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AMS 1980 subject classifications: 01A55
KEY WORDS: Symmetry, crystallography, group theory, projective geometry, graphical statics, Culmann, engineering statics

Recently a research project on the relationship between the development of theoretical mathematics and mathematization in applied fields during the 19th century has been pursued at the Universität-Gesamthochschule Wuppertal. It concerns two case studies selected more or less from the "extremes" of the spectrum of possible applications of mathematics:

—The first case deals with crystallography, which during the period under consideration was transformed from a branch of natural history into a mathematized experimental science. The investigation focuses on the symmetry concepts and their underlying implicit group ideas used by crystallographers of the first half of the century, their relationship to the origins of geometrical group theory, and their role as background for the successful classification of crystallographic space groups by Fedorov and Schoenflies.

—The second case refers to the attempts to theorize the rising new engineering sciences by means of methods from theoretical mathematics. Here different approaches to duality phenomena in graphical methods of engineering statics have been investigated, centering on Carl Culmann's program to theorize graphical statics with methods from projective geometry.

In these case situations we find wide differences with respect to the types of approach to mathematization of an applied field and with respect to styles of theorization, types of interaction of the applied field and mathematics proper, and

the resulting success of the mathematization. These seem to shed some light on characteristic features of the relationship between the development of theoretical mathematics and mathematization in applied fields more generally. The result of the project is to be published in German under the title "Symmetrie–Gruppe–Dualität. Studien zur Beziehung zwischen theoretischer Mathematik und Anwendungen in Kristallographie und Baustatik des 19. Jahrhunderts."